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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/788,339	02/21/2001	Sadaji Tsuge	P107336-00018	1063

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EXAMINER	
MUTSCHLER, BRIAN L	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/788,339	TSUGE, SADAJI	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,5 and 7* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5 and 7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 27, 2004, has been entered.

Comments

2. Applicant's cancellation of claims 3, 6, and 8 in the response received February 27, 2004, is acknowledged.

3. In light of Applicant's cancellation of claim 6, the rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Hanoka et al. (U.S. Pat. No. 6,353,042) in view of Yamagishi et al. (U.S. Pat. No. 6,300,556), in view of Nakagawa et al. (U.S. Pat. No. 5,858,120) and in view of JP 11-307791 has been withdrawn because the rejection is now redundant.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, 4, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-307791, herein referred to as JP '791, in view of Yamagishi et al. (U.S. Pat. No. 6,300,556) and in view of Green et al. (U.S. Pat. No. 5,942,050).

Regarding claim 1, JP '791 disclose a solar cell module comprising a solar cell **1** encapsulated within a sealing resin **2**, and having a glass front surface side light transmitting member **3** and a resin film rear surface member **4** (fig. 1). Both the front surface side light transmitting member **3** and the rear surface member **4** transmit incident light (fig. 1). The sealing resin **2** is interposed between the front surface light transmitting member **3** and the solar cells **1** and is also interposed between the rear surface member **4** and the solar cells **1** (fig. 1). The solar cell **1** comprises a n-type crystalline silicon substrate **11** and has amorphous silicon semiconductor layers **12**, **13**, **16** and **17** formed thereon, including p-type amorphous layer **14**, which forms a pin junction with the substrate **11** (fig. 2). The solar cell **1** also has two transparent electrodes **14** and **18** at the top and bottom surfaces (fig. 2). These electrodes allow light to enter from both the front and rear surfaces of the solar cell module (fig. 1).

Regarding claim 2, light is incident from both sides of the solar cell (fig. 1).

Regarding claims 4 and 5, the rear surface member is formed of a transparent resin film (PET) (see figure 1 and paragraph [0025]).

Regarding claim 7, the solar cell element **1** comprises four amorphous semiconductor layers **12**, **13**, **16** and **17** (fig. 2).

The solar cell module of JP '791 differs from the instant invention because JP '791 does not disclose that the front surface side light transmitting member contains sodium and that a p-n junction is formed between the crystalline substrate and the thin film amorphous semiconductor layer, as recited in claim 1.

Regarding claim 1, Yamagishi et al. disclose the use of soda lime glass, which contains sodium, as a surface member (col. 7, line 29). Soda lime glass is a conventional glass used in solar cell modules because it is inexpensive.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell module of JP '791 to use soda lime glass as the front surface member, as taught by Yamagishi et al., because soda lime glass is very inexpensive and provides excellent weather resistance. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP § 2144.07.

JP '791 discloses an intrinsic layer **12** between the n-type crystalline substrate **11** and the p-type amorphous layer **13**. Intrinsic layers help reduce recombination at the junction, but do not alter the operation of the junction between the p-type and n-type semiconductor layers. (On page 5 of Applicant's response received February 27, 2004, Applicant acknowledges the junction of JP '791 as a p-n junction.) Green et al. teaches that intrinsic layers are optional (col. 4, lines 61-63). The omission of an element and its function is obvious if the function of the element is not desired. *Ex parte Wu*, 10 USPQ

2031 (Bd. Pat. App. & Inter. 1989). See MPEP § 2144.04. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell element of JP '791 by deleting the intrinsic layer because the omission of an element and its function is obvious if the function is not desired and Green et al. teach that intrinsic layers are optional.

6. Claims 1, 2, 4, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka et al. (U.S. Pat. No. 6,353,042) in view of Yamagishi et al. (U.S. Pat. No. 6,300,556), JP 11-307791, and Green et al. (U.S. Pat. No. 5,942,050).

Regarding claim 1, Hanoka et al. disclose a solar cell module having a plurality of solar cells **22** encapsulated within a sealing material **10** (fig. 2). A front surface light transmitting member **26** is made of glass, and a rear surface member **28** is made of glass or a resin, such as Tedlar™, a transparent film (col. 5, line 65 to col. 6, line 9). A transparent film would allow light to enter from both sides of the solar cell. The solar cells **22** may comprise crystalline or amorphous material and may be made of silicon or one of several other semiconductor materials (col. 1, lines 31-35; col. 6, lines 19-59). Hanoka et al. specifically disclose a module as shown in figure 2, "a solar cell module **20** in which the encapsulant material **10** encapsulates interconnected crystalline silicon solar cells **22**" (col. 5, lines 55-57). Hanoka et al. is silent on the details of the junction within the crystalline silicon solar cells **22**.

Regarding claims 2, 4, and 5, Hanoka et al. disclose a front surface light transmitting member **26** is made of glass, and a rear surface member **28** is made of

glass or a resin, such as Tedlar™, a transparent film (col. 5, line 65 to col. 6, line 9). This structure permits light to enter from either side of the solar cell.

The solar cell module disclosed by Hanoka et al. differs from the instant invention because Hanoka et al. do not disclose the following:

a. The front surface member containing sodium, as recited in claim 1.

b. The solar cell having a p- or n-type crystalline silicon substrate and an n- or p-type semiconductor layer formed on the substrate to form a p-n junction, as recited in claim 1.

c. The crystalline substrate is positioned on a side of the front surface side light transmitting member and the semiconductor layer is positioned on a side of the rear surface side member, as recited in claim 1.

Regarding claim 1, Yamagishi et al. disclose the use of soda lime glass, which contains sodium, as a surface member (col. 7, line 29). Soda lime glass is a conventional glass used in solar cell modules because it is inexpensive.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell module of Hanoka et al. to use soda lime glass as the front surface member, as taught by Yamagishi et al., because soda lime glass is very inexpensive and provides excellent weather resistance.

Regarding claim 1, JP '791 disclose a solar cell module comprising a solar cell **1** encapsulated within a sealing resin **2**, and having a glass front surface side light

transmitting member **3** and a resin film rear surface member **4** (fig. 1). The solar cell **1** comprises a n-type crystalline silicon substrate **11** and has amorphous silicon semiconductor layers **12**, **13**, **16** and **17** formed thereon, including p-type layer **13** (fig. 2). The solar cell **1** also has two transparent electrodes **14** and **18** on the top and bottom surfaces (fig. 2). These electrodes allow light to enter from both the front and rear surfaces of the solar cell module (fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell module of Hanoka et al. to use a crystalline silicon substrate and an amorphous layer forming a heterojunction, as taught by JP '791, because the solar cell of JP '791 efficiently utilizes all of the light incident on both sides of the solar cell.

JP '791 discloses an intrinsic layer **12** between the n-type crystalline substrate **11** and the p-type amorphous layer **13**. Intrinsic layers help reduce recombination at the junction, but do not alter the operation of the junction between the p-type and n-type semiconductor layers. (On page 5 of Applicant's response received February 27, 2004, Applicant acknowledges the junction of JP '791 as a p-n junction.) Green et al. teaches that intrinsic layers are optional (col. 4, lines 61-63). The omission of an element and its function is obvious if the function of the element is not desired. *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989). See MPEP § 2144.04. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell element of JP '791 by deleting the intrinsic layer because

the omission of an element and its function is obvious if the function is not desired and Green et al. teach that intrinsic layers are optional.

Response to Arguments

7. Applicant's arguments filed February 27, 2004, have been fully considered but they are not persuasive.

8. Regarding the rejection of the claims over JP '791 and Yamagishi, Applicant argues that the combination "fail[s] to teach and/or suggest a solar cell element having a transparent electrode at one side of a p-type or n-type thin crystalline silicon substrate, on which a transparent electrode is formed" and "the crystalline silicon substrate positioned between the thin film amorphous semiconductor layer and the light transmitting member" (see pages 5-6 of Applicant's response). Applicant states, "The thin film amorphous semiconductor layer [of JP '791] forming a p-n junction is directly facing the light transmitting member" (see page 5 of Applicant's response). This argument is not persuasive because Figure 2 of JP '791 clearly shows a transparent electrode **14, 18** formed at either side of the crystalline silicon substrate. Furthermore, Figure 1 clearly shows that light enters from both sides of the solar cell module. Thus, both surface members **3** and **4** are light-transmitting surface members and light is incident on both sides of the crystalline substrate **11**. Since JP '791 and Yamagishi teach all of the elements recited in the instant claims, Applicant's arguments are not persuasive.

9. Regarding the rejection of the claims over Hanoka, Yamagishi, and JP '791, Applicant relies upon the arguments addressed above.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Pat. No. 5,401,336 (Noguchi et al.) discloses the formation of heterojunction cells with and without intrinsic layers (col. 1, lines 13-48). The cells, which are low in cost and high in conversion efficiency, comprise crystalline silicon substrates and amorphous silicon semiconductor layers (col. 1, lines 15-18).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

blm
March 15, 2004

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